WHAT IS CLAIMED IS:

1. A receiver providing a demodulated output from a received discrete multi-tone modulated input signal, the input signal received from a communication channel having noise thereon, the input signal having modulated thereon a digital bit stream, the receiver comprising:

first and second data paths coupled to receive the input signal;

the first of the two data paths comprising a first stage having a frequency response for applying a discrete Fourier Transform to the input signal and further comprising a frequency domain equalizer having an input coupled to an output of the first stage;

the second of the two data paths comprising a window stage for suppressing side lobes of the frequency response of the first stage; and

a logic stage for selecting an output from the first data path or the second data path based on a predefined test and for providing a selected output representing the demodulated digital bit stream.

2. The receiver of claim 1, further comprising a decision feed back equalizer in said second data path having as an input an output from said window stage and for cancelling inter-bin interference created by said window stage.

3. The receiver of claim 2, wherein the decision feedback equalizer receives a feedback signal from an output of said logic stage to cancel the inter-bin interference.

4. The receiver of claim 3, further comprising a slicer stage having as an input the output of said logic stage and providing as an output the demodulated digital bit stream; said demodulated digital bit stream being provided as said feedback signal.

5. The receiver of claim 1, wherein the window stage in said second path comprises a time domain window stage.

6. The receiver of claim 5, wherein said time domain window stage has an input directly from a time domain equalizer.

7. The receiver of claim 6, further comprising a second stage for performing a discrete Fourier transform in said second path, the second stage having an input receiving an output from said time domain window stage.

8. The receiver of claim 7, further comprising a decision feedback equalizer in said second data path having an input from said second stage and having an output provided to said logic stage.

9. The receiver of claim 8, wherein the decision feedback equalizer receives a further input from said first stage.

10. The receiver of claim 1, wherein said window stage in the second data path comprises a frequency domain window stage.

11. The receiver of claim 10, further comprising a decision feedback equalizer in said second data path having an input receiving an output from said frequency domain window stage, said decision feedback equalizer being provided for cancelling inter-bin interference created by the frequency domain window stage; an output of said decision feedback equalizer being provided to said logic stage.

12. The receiver of claim 11, further wherein the decision feedback equalizer has a further input from said first stage.

13. The receiver of claim 12, wherein a feedback signal is provided from an output of said logic stage to said decision feedback equalizer to cancel inter-bin interference created by said frequency domain window stage.

14. The receiver of claim 13, wherein the logic stage provides an output to a slicer stage, the slicer stage providing said demodulated digital bit stream as an output, said feedback signal comprising said demodulated output.

15. The receiver of claim 10, wherein said frequency domain window stage has an input coupled to an output of said first stage.

16. The receiver of claim 1, wherein the logic stage selects an output from the first data path or the second data path based on determining which data path

provides more bits per symbol or has a higher signal to noise ratio.

17. The receiver of claim 16, wherein in the event of a tie, the logic stage selects the first data path.

18. The receiver of claim 1, wherein the window stage comprises one of a Hanning window function, a rectangular window function, a DPS window function, a Bartlett window function and a window function having a finite number of frequency domain coefficients.

19. The receiver of claim 5, wherein the time domain window stage performs time domain pulse shaping by a sample-by-sample multiplication of the output from the time domain equalizer by window coefficients defining a time domain window function of the time domain window stage.

20. The receiver of claim 10, wherein the frequency domain window stage performs frequency domain pulse shaping on a bin-by-bin basis by performing a linear combination of bin outputs and frequency domain window coefficients defining a frequency domain window function of the frequency domain window stage.

21. The receiver of claim 1, wherein the frequency domain equalizer comprises a one-tap per-bin equalizer.

22. The receiver of claim 1, further comprising a time domain equalizer having as an input the

input signal received from the communication channel, the time domain equalizer having an output provided to the first and second data paths.

23. The receiver of claim 10, wherein the window stage has an input from an output of the frequency domain equalizer.

24. A method of providing a demodulated output from a received discrete multi-tone modulated input signal, the input signal received from a communication channel having noise therein, the input signal having modulated thereon a digital bit stream, the method comprising:

providing the input signal to first and second data paths;

applying a discrete Fourier Transform to the input signal in the first data path to generate a first transformed signal and frequency domain equalizing the first transformed signal to provide a frequency domain equalized signal;

suppressing side lobes of the frequency response of the first transformed signal in the second data path by applying a window function to provide a pulse shaped signal; and

selecting an output from the first data path or the second data path based on a predefined test and providing a selected output representing the demodulated digital bit stream.

25. The method of claim 24, further comprising performing decision feed back equalizing in said second

data path on said pulse shaped signal for cancelling inter-bin interference created by said window function.

26. The method of claim 25, further comprising during the step of decision feedback equalizing, providing a feedback signal comprising the selected output to cancel the inter- bin interference.

27. The method of claim 26, further comprising slicing the selected output and providing the sliced output as the demodulated digital bit stream; said demodulated digital bit stream being provided as said feedback signal.

28. The method of claim 24, wherein the step of applying a window function in said second path comprises applying a time domain window function.

29. The method of claim 28, wherein said step of applying a time domain window function comprises applying a time domain window function directly to said input signal.

30. The method of claim 29, further comprising performing a discrete Fourier transform in said second path to provide a second transformed signal, after said step of applying a time domain window function.

31. The method of claim 30, further comprising performing decision feedback equalizing in said second data path on said second transformed signal.

32. The method of claim 31, further comprising using said first transformed signal during the step of decision feedback equalizing.

33. The method of claim 24, wherein said step of applying a window function in the second data path comprises applying a frequency domain window function.

34. The method of claim 33, further comprising performing decision feedback equalizing in said second data path on said pulse shaped signal, said step of decision feedback equalizing being provided for cancelling inter-bin interference created by the frequency domain window function; and providing a decision feedback equalized signal for selection as an output signal.

35. The method of claim 34, further comprising using the frequency domain equalized signal during said step of decision feedback equalizing.

36. The method of claim 35, further comprising providing a feedback signal during said step of decision feedback equalizing to cancel inter-bin interference created by said frequency domain window function.

37. The method of claim 36, further comprising slicing the selected output into the demodulated digital bit stream, said feedback signal comprising said demodulated digital bit stream.

38. The method of claim 33, further comprising applying the frequency domain window function to said first transformed signal.

39. The method of claim 24, wherein the step of selecting an output from the first data path or the second data path comprises selecting an output based on determining which data path provides more bits per symbol or has a higher signal to noise ratio.

40. The method of claim 39, wherein in the event of a tie, the step of selecting an output comprises selecting the first data path.

41. The method of claim 24, wherein the window function comprises one of a Hanning window function, a rectangular window function, a DPS window function, a Bartlett window function and a window function having a finite number of frequency domain coefficients.

42. The method of claim 28, wherein said step of applying a time domain window function comprises time domain pulse shaping by a sample-by-sample multiplication of the time domain equalized signal by window coefficients defining the time domain window function.

43. The method of claim 33, wherein the step of applying a frequency domain window function comprises frequency domain pulse shaping on a bin-by-bin basis by performing a linear combination of bin outputs and frequency domain window coefficients defining the frequency domain window function.

44. The method of claim 24, wherein the step of frequency domain equalizing comprises frequency domain equalizing using a one-tap per-bin equalizer.

45. The method of claim 24, further comprising time domain equalizing the input signal received from the communication channel to produce a time domain equalized signal, and providing the time domain equalized signal to the first and second data paths.

46. The method of claim 33 further comprising applying the window function to the frequency domain equalized signal.